Go to ME Design day in the Union, Thur, 4/17. Write several paragraphs about what you see there. Especially:
1. Note control systems and/or systems with feedback.
2. Tell which senior project most impressed you and why.
3. Observe some at least part of one of the competitions and write at least a paragraph about it (suggest improvements).

ECE 3510 homework # 22
Due Tue, 4/22/08

1. Problem 6.6 (p.182) in the text.
2. Problem 6.7 (p.182) in the text.
3. Problem 6.8 (p.183) in the text
4. Problem 6.9 (p.183) in the text
5. Problem 6.10 (p.183) in the text

Answers
1. (6.6) a) \[ x(k) = -4 \delta(k) + 2 + 2 \cdot \sqrt{2} \cdot \cos \left( \frac{\pi \cdot k + \pi}{4} \right) \]
   \[ x(0) = 0 \quad x(1) = 0 \quad x(2) = 0 \quad x(3) = 4 \quad x(4) = 4 \quad x(5) = 0 \quad x(6) = 0 \quad x(7) = 4 \quad x(8) = 4 \]
2. (6.7) Bounded Converges \[ x^{(\infty)} = 0 \]
   a) yes yes 0 vanishes in a finite time (all poles are at zero)
   b) yes yes 0
   c) yes no 0
   d) yes yes 8/9
e) yes yes 2
   f) yes no
   g) yes no
   h) yes yes 1
3. (6.8) a) yes
4. (6.9) a) \[ H(z) = \frac{z^2}{z^2 - a \cdot z + a^2} \] stable if: \[ |a| < 1 \]
b) \[ H(z) = \frac{12z^2 + 48z - 3}{z \cdot (2z - 1)} \] stable
5. (6.10) a) \[ H(z) = \frac{z^2}{z^2 - z - 1} \] unstable
   b) \[ \frac{1 + \sqrt{5}}{2} = 1.618 \]

ECE 3510 homework # 23
Due Wed, 4/23/08

May be handed in with the final, Fri 4/25, 10:30 am

1. Problem 6.11 (p.184) in the text.
2. Problem 6.12 (p.184) in the text.
3. Problem 7.1 (p.216) in the text
4. Problem 7.2 (p.216) in the text

Answers
1. (6.11) a) gain = \[ \frac{2}{3} \] \[ y_{ss} = \frac{-2}{2} \] 
   b) \[ 2 \cdot e^{\frac{\pi}{2}} \] (frequency response) \[ -2 \cdot \sin \left( \frac{\pi \cdot k}{2} \right) \]
2. (6.12) \[ a = 1 \quad g < 1 \]
3. (7.1) a) \[ H_d(z) = \frac{z \cdot (T - 1 + e^{-T}) + (1 - e^{-T} - T \cdot e^{-T})}{(z - 1) \cdot (z - e^{-T})} \]
   b) \[ H_d(z) = \frac{(1 - \cos(T)) \cdot (z + 1)}{z^2 - 2 \cdot \cos(T) \cdot z + 1} = 0 \] @ \[ T = 2 \pi \]
4. (7.2) 60Hz